Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1   1. (Original): A disk array system comprising:

2   a disk controller connected to a host system via a channel path;

3   a maintenance terminal connected to the disk controller; and

4   a disk array connected to the disk controller via a disk channel, said disk array

5 being composed of a plurality of drive boards each mounting thereon a plurality of disk drives

6 connected to wiring on the board, and a common board provided with a plurality of connectors

7 for connecting the wiring on each of the drive boards to wiring for the disk channel, the a

8 plurality of drive boards being detachably mounted on the common board via the plurality of

9 connectors,

10   wherein said disk controller defines a part of the drive boards in the disk array as

11 spare boards and the rest as active boards, manages (N + 1) pieces of the disk drives (N $\geqq$ 2)

12 mounted on different drive boards in a group of active drive boards as a logical group,

13 dispersively allocates a memory area for storing error correction information generated in each

14 logical group to the (N + 1) pieces of disk drivers or fixedly allocates the memory area to a

15 specific disk drive, and controls the writing and reading of data in the disk array,

16   the disk controller comprising:

17   means for reorganizing logical groups when failure occurs in any active

18   disk drive in the disk array, after storing the same data as that stored in disk drives on the

19   faulty board on which a faulty drive is mounted into corresponding one of the disk drives

20   on the substitution board selected from among a group of spare drive boards, so that each

21   logical group to which one of disk drives on the faulty board belongs includes a new disk

22   drive on the substitution board in place of the disk drive on the faulty board; and

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23   means for informing said maintenance terminal that the faulty board is

24   replaceable after the reorganization of the logical groups is completed.

1   2.   (Currently amended): A-The disk array system according to Claim 1,

2   wherein said means for reorganizing the logical groups comprises:

3   means for writing data regenerated based upon data read out from the other plural

4   disk drives that belong to the same logical group as the faulty drive into one of the substitution

5   disk drives on the substitution board in place of the faulty drive; and

6   means for sequentially copying data read out from normal disk drives mounted on

7   the faulty board into the other of the substitution disk drives on the substitution board.

1   3.   (Currently amended): A-The disk array system according to Claim 1,

2   wherein

3   said common board is provided with a plurality of bypass circuits for selectively

4   bypassing each connector for connecting to the drive board from wiring for the disk channel; and

5   said disk controller is provided with means for switching one of the bypass

6   circuits corresponding to the connector of the faulty board to a bypassed state after the

7   reorganization of the logical groups is completed.

1   4.   (Currently amended): A-The disk array system according to Claim 1,

2   wherein said disk controller manages a recovered board as a spare drive board when the

3   recovered board is connected to a connector of the faulty board again.

1   5.   (Currently amended): A-The disk array system according to Claim 1,

2   wherein said disk controller has a board management table for managing each of said drive

3   boards forming the disk array according to a status code that changes in the order of a normal

4   state, an exchange waiting state and a spare state, and said disk controller manages a board in a

5   normal state as the active board and a board in a spare state as the spare board.

1   6.   (Currently amended): A-The disk array system according to Claim 1,

2   wherein:

3   said connectors for connecting with the drive boards are located on the common

4   board in two-dimensional arrangement having coordinate values on the X-axis and the Y-axis,

5   and the plurality of disk drives are arranged on each drive board in a direction of the Z-axis;

6   each of said logical group is formed by (N + 1) pieces of disk drives having the

7   same X coordinate value, the same Z coordinate value and different Y coordinate value; and

8   said means for reorganizing logical groups selects as the substitution board a drive

9   board having the same Y coordinate value as that of the faulty board from among a group of

10   spare drive boards, and correlates the disk drives on the faulty board and substitution disk drives

11   on the substitution board according to respective Z coordinate values.

1   7.   (Original): A failure recovering control method executed by a disk

2   controller in a disk array system composed of the disk controller connected to a host system and

3   a maintenance terminal, and a disk array connected to the disk controller via a disk channel, the

4   disk array being composed of a plurality of drive boards each mounting thereon a plurality of

5   disk drives connected to wiring on the board, and a common board provided with a plurality of

6   connectors for connecting the wiring on each of the drive boards to wiring for the disk channel,

7   the plurality of drive boards being detachably mounted on the common board via the plurality of

8   connectors,

9   wherein said disk controller defines a part of the drive boards in the disk array as

10   spare boards and the rest as active boards, manages (N + 1) pieces of disk drives (N $\geq$ 2)

11   mounted on different drive boards in a group of active drive boards as a logical group,

12   dispersively allocates a memory area for storing error correction information generated in each

13   logical group to the plurality of disk drives or fixedly allocates the memory area to a specific

14   disk drive, and controls the writing and reading of data in the disk array,

15   the method comprising the steps of:

16   selecting a substitution board to be used in place of a faulty board on

17   which a faulty drive is mounted from among a group of said spare drive boards when

18   failure occurs in any active disk drive in the disk array;

19   storing the same data as that stored in each disk drive on the faulty board

20   into disk drives on the substitution board selected from among the group of spare drive

21   boards;

22   reorganizing logical groups to each of which a disk drive on the faulty

23   board belongs into new configuration including a new disk drives on the substitution

24   board in place of the disk drive on the faulty board; and

25   informing the maintenance terminal that the faulty board is replaceable

26   after the logical groups are reorganized.

1   8.   (Currently amended): A The failure recovering control method according

2   to Claim 7, wherein the step of storing data into the disk drives on the substitution board is

3   comprised of:

4   a step of writing data regenerated based upon data read out from the other plural

5   disk drives that belong to the same logical group as the faulty drive into one of substitution disk

6   drives on the substitution board in place of the faulty drive; and

7   a step of sequentially copying data read out from normal disk drives mounted on

8   the faulty board into the other of the substitution disk drives on the substitution board.

1   9.   (Currently amended): A The failure recovering control method according

2   to Claim 7, wherein the common board is provided with a plurality of bypass circuits for

3   selectively bypassing each connector for connecting to the drive board from wiring for the disk

4   channel; and the control method further comprising a step of switching one of the bypass circuits

5   corresponding to a connector of the faulty board to a bypassed state after the reorganization of

6   the logical groups.

1   10.   (New): A disk array system comprising:

2   a disk controller; and

3   a disk array connected to the disk controller, said disk array being composed of a

4   plurality of drive boards each mounting thereon a plurality of disk drives, and a common board

5   on which the a plurality of drive boards being detachably mounted,

6   wherein said disk controller defines a part of the drive boards in the disk array as

7   a first drive board group and the rest as a second drive board group, and manages a plurality of

8   disk drives mounted on different drive boards in the first drive board group as a logical group,

9   the disk controller comprising:

10   means for reorganizing logical groups when failure occurs in any active

11   disk drive belonging to the first drive board group, after storing the same data as that

12   stored in disk drives on the faulty board on which a faulty drive is mounted into

13   corresponding one of the disk drives on a substitution board selected from the second

14   drive board group, so that each logical group to which one of disk drives on the faulty

15   board belongs includes a new disk drive on the substitution board in place of the disk

16   drive on the faulty board; and

17   means for informing a maintenance terminal that the faulty board is

18   replaceable after the reorganization of the logical groups is completed.

1   11.   (New): The disk array system according to Claim 10, wherein said means

2   for reorganizing the logical groups comprises:

3   means for writing data regenerated based upon data read out from the other plural

4   disk drives that belong to the same logical group as the faulty drive into one of the substitution

5   disk drives on the substitution board in place of the faulty drive; and

6   means for copying data read out from normal disk drives mounted on the faulty

7   board into the other of the substitution disk drives on the substitution board.

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1   12.   (New): The disk array system according to Claim 10, wherein

2   said common board is provided with a plurality of connectors for connecting

3   wiring on each of the drive boards to wiring for disk channel, and a plurality of bypass circuits

4   for selectively bypassing each of said connectors from the wiring for the disk channel; and

5   said disk controller is provided with means for switching one of the bypass

6   circuits corresponding to the connector of the faulty board to a bypassed state after the

7   reorganization of the logical groups is completed.

1   13.   (New): The disk array system according to Claim 10, wherein

2   said common board is provided with a plurality of connectors for connecting

3   wiring on each of the drive boards to wiring for disk channel; and

4   said disk controller manages a recovered board as a drive board belonging to said

5   second drive board group when the recovered board is connected to a connector of the faulty

6   board again.

1   14.   (New): The disk array system according to Claim 10, wherein said disk

2   controller has a board management table for managing each of said drive boards forming the disk

3   array according to a status code that changes in the order of a normal state, an exchange waiting

4   state and a spare state, and said disk controller manages a board in a normal state as a drive board

5   belonging to said first drive board group and a board in a spare state as a drive board belonging

6   to said second drive board group.

1   15.   (New): The disk array system according to Claim 10, wherein:

2   said common board is provided with a plurality of connectors for connecting

3   wiring on each of the drive boards to wiring for disk channel, said connectors are located on the

4   common board in two-dimensional arrangement having coordinate values on the X-axis and the

5   Y-axis, and the plurality of disk drives are arranged on each drive board in a direction of the Z-

6   axis;

7   each of said logical group is formed by a plurality of disk drives having the same

8   X coordinate value, the same Z coordinate value and different Y coordinate value; and

9   said means for reorganizing logical groups selects as the substitution board a drive

10   board having the same Y coordinate value as that of the faulty board from said second drive

11   board group, and correlates the disk drives on the faulty board and substitution disk drives on the

12   substitution board according to respective Z coordinate values.

1   16.   (New): The disk array system according to Claim 10, wherein:

2   said disk controller performs data read and data write in said disk array,

3   recognizing drive boards belonging to said first disk drive board group as active drive boards and

4   each drive board belonging to said second disk drive board group as a spare drive board, and

5   said means for reorganizing logical groups adds said substitution board to the

6   active drive boards and excludes said faulty board from the active drive boards after storing data

7   into the disk drives on the substitution board.

1   17.   (New): A failure recovering control method executed by a disk controller

2   in a disk array system composed of the disk controller and a disk array connected to the disk

3   controller, the disk array being composed of a plurality of drive boards each mounting thereon a

4   plurality of disk drives, and a common board on which the plurality of drive boards being

5   detachably mounted,

6   wherein said disk controller defines a part of the drive boards in the disk array as

7   a first drive board group and the rest as a second drive board group, manages a plurality of disk

8   drives mounted on different drive boards in said first drive board group as a logical group,

9   the method comprising the steps of:

10   selecting a substitution board to be used in place of a faulty board on

11   which a faulty drive is mounted from said second drive board group when failure occurs

12   in any active disk drive belonging to said first drive board group;

13   storing the same data as that stored in each disk drive on the faulty board

14   into disk drives on the substitution board;

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15   reorganizing logical groups to each of which a disk drive on the faulty

16   board belongs into new configuration including a new disk drives on the substitution

17   board in place of the disk drive on the faulty board; and

18   informing a maintenance terminal that the faulty board is replaceable after

19   the logical groups are reorganized.

1   18.   (New): The failure recovering control method according to Claim 17,

2   wherein the step of storing data into the disk drives on the substitution board is comprised of:

3   a step of writing data regenerated based upon data read out from the other plural

4   disk drives that belong to the same logical group as the faulty drive into one of substitution disk

5   drives on the substitution board in place of the faulty drive; and

6   a step of copying data read out from normal disk drives mounted on the faulty

7   board into the other of the substitution disk drives on the substitution board.

1   19.   (New): The failure recovering control method according to Claim 17,

2   wherein:

3   said common board is provided with a plurality of connectors for connecting

4   wiring on each of the drive boards to wiring for disk channel and a plurality of bypass circuits for

5   selectively bypassing each of said connectors from wiring for the disk channel; and

6   the control method further comprising a step of switching one of the bypass

7   circuits corresponding to a connector of the faulty board to a bypassed state after the

8   reorganization of the logical groups.

1   20.   (New): The failure recovering control method according to Claim 17,

2   wherein:

3   said disk controller performs data read and data write in said disk array,

4   recognizing drive boards belonging to said first disk drive board group as active drive boards and

5   each drive board belonging to said second disk drive board group as a spare drive board, adds

6   said substitution board having been completed data storing to the active drive boards and

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7   excludes said faulty board from the active drive boards through said reorganization of logical

8   group performed when failure occurs in any active disk drive.